Implementation of Washington's TMDL Program 1998-2003

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In an October 31, 1997, Memorandum of Agreement (MOA), the U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) agreed to jointly evaluate the progress and success of implementation plans developed for Total Maximum Daily Load (TMDL) reports. The MOA specified that the evaluation consider the following factors:

- whether implementation measures such as BMPs have been put into effect
- whether NPDES permit limits are consistent with TMDLs
- whether interim targets in the implementation plans have been met
- whether additional implementation measures have been instituted where needed

This report examines the implementation activities associated with the 308 TMDLs approved or issued by EPA in Washington from January 1, 1998 through July 31, 2003. These 308 TMDLs were located in 28 different watersheds, and covered a wide range of pollutants including fecal coliform, temperature, dissolved oxygen (DO), ammonia, total dissolved gas, sediment, toxic metals, and pesticides. The majority of the TMDLS (67%) were conducted for either fecal coliform (114 TMDLs) or temperature (92 TMDLs).

For each TMDL project, we have evaluated whether interim or final TMDL targets have been established, whether those targets have been met, and whether or not the Detailed Implementation Plans (DIPs) have been completed. The effectiveness of point-source and non-point source implementation is examined for each TMDL via NPDES permit issuance and BMP implementation, respectively.

Report Findings

Non-point Source and Point-source Implementation Measures

As part of the TMDL process, Ecology identifies the specific ways in which sources of pollution will be identified and reduced, the timeframes for meeting water quality standards, and monitoring plans. These findings are documented in the Detailed Implementation Plan (DIP), which is typically completed one year after TMDL approval. DIPs also identify the local, State, Tribal or Federal agency responsible for implementing pollution control measures. Ecology has completed DIPs in 18 of the 28 project areas, and completion of 7 additional DIPs is expected in 2005.

Actions to improve water quality often begin prior to completion of the TMDL or the DIP. In reviewing the implementation activities occurring in the 28 project areas, we found documentation of implementation activities in 27 of the 28 project areas. Implementation is not yet taking place in the Spokane River, where implementation of point source reductions has not yet occurred, as discussed below. The attached TMDL project descriptions include information on both point and non-point source implementation activities. Non-point source implementation activities range from fencing projects and off-stream watering troughs (Colville River), piping of irrigation ditches (Dungeness River) to low-impact development retrofits (e.g. rain gardens) in Snohomish County.

Point source dischargers were found to be a source of pollution in half of the 28 TMDL project areas. The type of point sources that received wasteload allocations (WLA) included 29 municipal or industrial dischargers, 9 municipal separate storm sewer system (MS4) permit areas, and a number of concentrated animal feeding operations (CAFOs). In reviewing the

NPDES permits for each of the dischargers, we found that WLA had been incorporated into 24 NPDES permits. The following WLA have not yet been incorporated into NPDES permits:

- The metals WLA for 4 dischargers to the Spokane River in eastern Washington were going to be incorporated in the NPDES permits in 2004. Reissuance of the permits has been delayed, however, until the TMDL for DO is completed.
- The MS4 phase 1 and phase 2 permits receiving WLAs in TMDLs have not yet been reissued (phase 1) or issued (phase 2).
- Three municipalities receiving temperature WLAs in the Chehalis Basin did not receive temperature limits in their NPDES permits. One municipal discharger will no longer discharge to the river during the critical period (summer), and meets the WLA requirements during the non-critical (winter) period; the WLA will be incorporated in the NPDES permit when that permit is reissued in 2009. The second discharger has changed its discharge location and will receive a temperature WLA when the permit is reissued in 2007. The third discharger's permit will be reissued in 2005.
- Numerous NPDES permits have not yet incorporated the WLA because the permits have not been reissued since the TMDLs were approved. For each of those permits, the WLA will be incorporated upon reissuance of the permit.

Interim targets

Improvements in water quality can happen quickly, with changes in cattle waste management practices, for example – or slowly, as trees grow and riparian areas are reestablished. For most of the TMDLs discussed in this report, not enough time has elapsed to determine whether water quality targets are being met. Monitoring data do show water quality improvement, however, in 13 of the 28 project areas. For 6 of those projects, it is possible to compare monitoring data to water quality targets established in the TMDL. For each of those 6 projects, data indicate that water quality is improving on schedule or ahead of schedule. Specifically, interim targets for the following fecal coliform TMDLs are being met at numerous (but not all) locations in the watershed:

- Grays Harbor
- Nooksack River
- Skagit River
- Skokomish River
- Union River.

In addition, the Lower Yakima River sediment / DDT TMDL is meeting its 5 year sediment target at most sites.

There are the 15 project areas where post-TMDL monitoring data are not available, or available data do not yet show water quality improvement. As discussed above, however, stakeholders are involved in implementing 14 of these TMDLs, and improvements in water quality are expected in the future. Post-TMDL monitoring has not been conducted on the 8 temperature TMDL projects because it is expected that it will take years to see the benefits of sediment reduction, and decades to see the benefits of restoring riparian areas.

Monitoring.

Effectiveness monitoring is the process of gathering and analyzing water quality information, after completion of a TMDL, to see if implementation efforts actually resulted in cleaner water. In 2002-2003, Ecology published TMDL Effectiveness Monitoring reports for TMDLs on the Puyallup River, Pipers Creek, Fenwick and Sawyer Lakes, and for three mills that produce bleached pulp and/or paper products, which received WLA for dioxin.

Post-TMDL Monitoring is conducted by a combination of federal, state, Tribal, local governments and non-governmental organizations. We found that monitoring data were available for 18 of the 28 project areas. For those project areas without monitoring data,

- 3 are for temperature TMDLs whose implementation effectiveness is being examined through evaluation of the FFR requirements, as discussed above (Humptulips, Little Klickitat, Teanaway)
- 3 are for TMDL projects that have been approved very recently, and for which improvement in water quality is not yet expected (Upper White River, Upper Yakima River, Snohomish Estuary)
- 1 is for a TMDL where the pollutant source has been eliminated (Chambers Creek)
- 1 is for a TMDL where point source implementation has not taken place, and water quality improvements are not yet expected (Spokane River).
- 1 is for a TMDL whose sole source of the pollutant is a point source discharger who must be in compliance with the NPDES permit limits in September, 2005. It is expected that ambient monitoring will be initiated at that time.

Conclusions

Our review of the 308 TMDLs approved in Washington from 1998-2003 reveals that 27 of the 28 TMDL projects are being implemented, and that water quality improvements have been verified in 13 of the 28 project areas.

TABLE OF CONTENTS

BELLINGHAM BAY (INNER) CONTAMINATED SEDIMENT **7**

CHAMBERS CREEK **8**

CHEHALIS RIVER AND GRAYS HARBOR **8**

COLUMBIA RIVER **12**

COLVILLE RIVER **13**

DUNGENESS RIVER **15**

GIBBONS CREEK **16**

GRANGER DRAIN **17**

HUMPTULIPS RIVER (UPPER) **18**

JOHNSON CREEK WATERSHED **19**

LITTLE KLICKITAT **20**

NOOKSACK RIVER **21**

NORTH CREEK **22**

QUINCY IRRIGATION DRAIN **23**

SALMON CREEK **24**

SKAGIT RIVER (LOWER) **25**

SKOKOMISH RIVER **27**

SNOHOMISH ESTUARY **28**

SNOHOMISH TRIBUTARIES (LOWER) **29**

SOUTH PRAIRIE CREEK WATERSHED **31**

SPOKANE RIVER **32**

TEANAWAY RIVER **32**

UNION RIVER **33**

WHITE RIVER (UPPER) **34**

WIND RIVER **35**

YAKIMA RIVER (UPPER) 36

YAKIMA RIVER (LOWER) 37

Bellingham Bay (Inner) Contaminated Sediment
Northwest Regional Office
Pollutants: sediment bioassay, mercury, phenol, PCBs, zinc, arsenic, lead, copper, 4-methylphenol, wood waste
Approved: December 31, 2001

Background: This TMDL addresses marine sediments in Inner Bellingham Bay which were contaminated primarily by historical practices. No ongoing sources have been identified as causing violations of marine Sediment Quality Standards.

TMDL implementation:
Detailed implementation plan: The DIP was completed in June 2003

Point source implementation: The mercury WLA for Georgia Pacific was incorporated in the facility NPDES permit (WA-0001091) in 2001. Subsequent to the issuance of that permit, Georgia Pacific eliminated the chlor-alkali plant from their waste stream and no longer has mercury discharges. All current sources discharging to inner Bellingham Bay went through a multiphase process of evaluation to assess compliance with the state's Sediment Management Standards; no ongoing sources of any of the pollutants addressed by this TMDL have been documented as currently contributing to the sediment quality impairments in the Bay.

Although Bellingham stormwater has not been identified as an on-going source of pollutants, the City is participating in on-going source control programs to ensure there are not gaps that could result in sediment contamination or recontamination. It is anticipated that the Phase II NPDES general municipal stormwater permit will address source control activities consistent with the implementation of this TMDL. Routine stormwater BMPs (catch basin cleaning, street sweeping) were in place by the time the study was completed.

Ecology's Toxics Cleanup Program is addressing sediment through an on-going voluntary cleanup program with the industry. The Model Toxics Control Act (MTCA) clean up actions for remediation of historic contamination are underway. Remediation of the WeldCraft Site is nearly complete.

Non-point source implementation: There are no non-point discharges of the pollutants addressed in this TMDL in Bellingham Bay.

Interim and final TMDL targets:
Achieving the requirements of the Sediment Management Standards (WAC Chapter 173-204) is the target. No interim targets were set because the major improvements would come with MTCA cleanup activities under voluntary compliance. When the clean up at a site is complete, water quality standards will be met. Natural attenuation may result in some improvement, but it is anticipated that sediment removal and or capping will be required at each of the identified sites.

Is water quality improving? Are additional implementation measures needed?
In 1999, surface concentrations of mercury, 4-methylphenol and wood material in the Whatcom Waterway area were significantly lower than concentrations detected several feet below the surface. This pattern corresponds to Bay-wide decreasing surface sediment concentrations over the past 25 years, due to source controls implemented in the G-P facility and in other areas of

Bellingham Bay beginning in the early 1970s. Clean sediment deposits from the Nooksack River are also contributing to the natural recovery of the surface sediment quality.

Monitoring efforts are being conducted by the Toxics Cleanup Program as part of the MTCA cleanup-up actions, and the on-going voluntary cleanup programs. Ecology's Water Quality Program will review the monitoring data to track improvements in sediment quality.

Chambers Creek
Pollutant: copper
Issued by EPA: February 20, 2000

Background: Steilacoom Lake covers 53 acres and is contained within the City of Lakewood, south of Tacoma. The Lake outlet is to Chambers Creek, which flows four miles before draining into Puget Sound. The Chambers Creek copper TMDL was issued by EPA as part of a larger TMDL that also addressed phosphorus in Steilacoom Lake. The Steilacoom Lake phosphorus TMDL was, however, vacated by Order of the U.S. District Court for the Western District of Washington on February 13, 2002, based on a request for vacatur by EPA.

TMDL Implementation:
Detailed Implementation Plan**:** No DIP for copper is planned. Copper sources were linked to herbicide applications and no future permits for copper containing herbicides will be issued.

Point-source implementation**:**
There are no point sources of copper in the watershed

Non-point source implementation:
The Steilacoom Lake homeowners association had been using copper-based herbicides in the Lake, but application of these pesticides in the Lake is no longer permitted by Ecology.

Interim and final TMDL targets: The TMDL established a copper load allocation of 0.0035 lbs/day. Since the TMDL was issued, however, the application of copper based herbicides has been prohibited, thereby eliminating the only source of copper in Lake Steilacoom.

Is water quality improving? Are additional implementation measures needed?
Unknown at this time.

Chehalis River and Grays Harbor
Southwest Regional Office
Pollutants: dissolved oxygen (DO), temperature, fecal coliform bacteria
Approved: May, 2000 (DO), August 9, 2001 (temperature) and May, 2003 and January, 2004 (fecal coliform)

Background: In 1996, EPA approved dissolved oxygen (BOD and ammonia), phosphorus and fecal coliform TMDLs for portions of the upper Chehalis basin. Revisions to the DO wasteload allocations in this 1996 TMDL were approved by EPA in 2000. TMDLs for temperature and fecal coliform were approved by EPA in 2001 (temperature), and 2003 and 2004 (fecal coliform);

the temperature TMDL addresses the upper Chehalis Basin, while the 2003 and 2004 fecal coliform TMDLs address the Lower and Upper Chehalis basin, respectively.

TMDL Implementation:

Detailed Implementation Plan: The DIP was completed in November, 2004. Ecology worked with the Chehalis Basin Partnership (CBP) to develop the DIP for all pollutants covered by approved TMDLs in the Chehalis Basin. The DIP is part of a comprehensive watershed plan to manage water supply, habitat, and water quality. The DIP discusses implementation of the temperature, DO and fecal coliform TMDLs.

Point source Implementation:

Dissolved Oxygen. A January 2000 consent decree established BOD and ammonia effluent limitations for the City of Centralia, the City of Chehalis and West Farm Foods, and required that these point sources comply with the revised effluent limitations by 2008. The 1996 Chehalis River DO TMDL was revised (and approved in 2000) to incorporate the interim limits from the consent decree. Chehalis has completed general facility planning and expects to complete construction of a new plant by 2006. The new facility will reuse 100% of effluent on a hybrid poplar plantation when the river flow is low. The public comment period for an NPDES permit containing WLA from the TMDL (as well as interim limits from the consent decree) closed in the fall of 2004. Centralia has constructed a new facility, and their May 2002 NPDES permit incorporated the dissolved oxygen WLAs. The West Farm Foods operation has acquired land to set up their water reclamation/land application strategy; the DO WLA were incorporated into the NDPES permit in 2000.

Temperature. The 2001 temperature TMDL identifies flow-based WLAs for all point sources in the Upper Chehalis River, including West Farm Foods, Centralia WWTP and Chehalis WWTP. The Centralia NPDES permit was reissued in May, 2002, and did not incorporate the numeric temperature WLA. The Chehalis NPDES permit developed in 2004 prohibits discharge during the low-flow period, and includes an analysis of compliance with the numeric WLA (although the WLA was not incorporated as a permit limit). It was determined that the Chehalis facility will not exceed the WLA during non-critical periods. During the summer low flow periods, the facility will be reusing wastewater and will not be discharging directly into the Chehalis River at that time. The West Farm Foods permit will be reissued in 2005.

Fecal Coliform. WLAs for all of the point sources are equivalent to existing permit limits in both the upper and lower Chehalis Basin. The municipal permittees receiving WLA in the lower Chehalis basin TMDL include: Aberdeen, Elma, Hoquiam, McCleary, Montesano, Ocean Shores, and Westport. The industrial permittees receiving WLA in this TMDL include: Ocean Spray Cranberries, Grays Harbor Paper 001, Grays Harbor Paper 002, Weyerhaeuser 001, Weyerhaeuser 002. The Grays Harbor/Lower Chehalis Bacteria TMDL stipulates that the WLA for one discharger (Weyco pulp mill) is subject to change if the non-point sources are not able to achieve their targets.

The 7 point sources receiving WLA in the upper Chehalis basin include the Grand Mound STP, Centralia STP, Chehalis STP, West Farm Foods, Pe Ell STP, Cedar Creek Department of Corrections and the Lewis County Water District.

Non-point source implementation.

Dissolved Oxygen. Improvements in agricultural and livestock management practices, including further implementation of the Dairy Nutrient Management Act and the emerging Concentrated

Animal Operation Regulations, are expected to reduce BOD loading and help improve DO conditions. Riparian cover improvements by private shoreline owners will help stabilize stream banks and reduce upland inputs. Improved municipal stormwater management and forest management practices will also contribute to improvement in DO levels.

Temperature. Thurston and Lewis Conservation Districts have made riparian improvements on Scatter Creek and Salzer Creek, respectively. Farm plans have been developed in many areas throughout the 2700 square mile watershed, and include fencing, livestock management, buffers and riparian plantings. Many farm plans have been fully implemented. Commercial dairy management improvements have also been extensive throughout the watershed.

Fecal Coliform.

- Stormwater reductions are planned in Grays Harbor by the Grays Harbor Council of Governments including Westport, Hoquiam, Aberdeen, and Cosmopolis.
- Aberdeen is monitoring and smoke testing illicit stormwater discharges, and vacuuming out storm drains.
- Cosmopolis is identifying stormwater inputs
- Farm management plans, fencing, and riparian area plantings are being done in the Humptulips and Satsop River watersheds by Grays Harbor CK, landowners and WA Dept. of Natural Resources.
- Chehalis Basin Education Consortium has a K – 12 education program including implementation monitoring, data collection and nature mapping.
- Grayland ditch cranberry growers' project used about $750,000 in CCWF grants to crib and cover the surface water in the ditches so that sprays aren't deposited directly onto the ditch surface. Cumulative project contributions from CCWF, corporate, EQIP, local CDs, etc. are almost $2 million.

Interim and final TMDL targets: Ecology believes that final fecal coliform TMDL targets can be achieved in the lower watershed by 2005, and in the upper watershed by 2010. No final target date has been projected for achieving water quality goals for DO. Ecology believes that the temperature TMDL targets will be met in 60 years. The Fish and Forest agreement allows private and state forests to follow forest practices rules until 2009 to demonstrate assurance that practices are effective for meeting water quality goals.

Is water quality improving? Are additional implementation measures needed?
Water quality has improved significantly in several areas. Fecal coliform concentrations in one tributary to the lower Chehalis (Humptulips river) have been reduced to a level that is 75% below the final TMDL target. Fecal coliform reduction goals were achieved ahead of schedule at another lower Chehalis tributary (Satsop river). A sampling station separating the lower and upper watershed (Porter) shows a 25% reduction in fecal coliform since 1998. Ambient monthly monitoring by Ecology at three stations in the mainstem Chehalis shows infrequent violations of water quality standards during the last two years.

These reductions are the result of financial and labor investments by individual landowners, farm service and resource agencies, and are also the result of major improvements at several sewage treatment plants throughout the watershed. Dairy management improvements are also believed to be significantly improving water quality.

A water quality monitoring plan was funded through the 2514 watershed planning program. Several volunteer groups, governments, and the Confederated Tribes of the Chehalis currently conduct monitoring. Comprehensive monitoring is being developed by the Chehalis Basin Partnership in the DIP. Ecology effectiveness monitoring will be done after implementation, and is typically initiated 5-6 years after TMDL approval.

Chehalis (Lower) and Skokomish River Tributaries (Simpson Northwest Timberlands)
Pollutant: temperature and sediment
Approved: July 17, 2000

TMDL Implementation:
Detailed Implementation Plan**:** The DIP was included in the October, 2003 Habitat Conservation Plan (HCP) developed under the Endangered Species Act.

Point-source implementation**:**
There are no point sources affecting temperature or sediment in the watershed.

Non-point source implementation:
A Habitat Conservation Plan was developed which describes activities that will cover all aspects of Simpson's forest practices and related land management. Specific management prescriptions designed to reduce the input of pollutants into streams include:

- Riparian conservation reserves
- Road management
- Unstable slope protection
- Hydrologic mature forest development
- Wetland conservation program

The approach for meeting load allocations is to increase the shade amount and quality, reduce sediment supply, increase large woody debris supply, set appropriate riparian and wetland buffer widths and management constraints, complete inventory and mapping of sensitive areas, complete a schedule for road inventory, repair and removal, and annual reporting of monitoring results, activities and future plans.

One third of the roads covered under the Simpson HCP have been brought up to standards and fish habitat improvements have been documented.

Interim and final TMDL targets: Targets were set for effective shade and sediment delivery. Simpson Resource Company changed its name to Green Diamond Resources Company in 2004. During the first 5 years, the Green Diamond Resources Company will 1) complete an inventory and prioritization of all road segments for remediation, 2) complete analysis for slope stability and mass wasting outside the areas already completed through the formal watershed analysis process, and 3) establish an experimental pilot in wood placement in conjunction with habitat monitoring activities. During the first 10 years, Green Diamond Resources Company will inventory and classify all wetlands by hydro-geomorphic category and Cowardin vegetation classes.

At year five and ten and continuing increments, a more formal review on progress of the plan and resource conditions will be done. At year 15, Green Diamond will convene a TMDL summit to assess road and sediment conditions.

Is water quality improving? Are additional implementation measures needed?
Water quality is improving. It is too early to tell, however, if additional implementation is needed. The HCP requires the Green Diamond Resources Co. to produce an annual report regarding implementation monitoring. Ecology received the initial implementation monitoring report for 2003 on April 16, 2004; this report is currently being reviewed by Ecology. The report discusses harvest units, wetland inventory, wildlife, road management, hydrologic maturity, experimental management and adaptive management. Monitoring covers several aspects of the plan such as temperature, shade and riparian stand condition. Also, there is a separate but extensive road sediment study being developed to evaluate sediment levels coming off different land forms; this report is due in fall 2004.

Columbia River (Lower)
Pollutant: total dissolved gas
Approved: November 18, 2002

TMDL Implementation
Detailed Implementation Plan: There are 4 dams on the stretch of the Columbia River included in this TMDL. Ecology and the Oregon Department of Environmental Quality are relying on the U.S. Army Corps of Engineers (USACE) to control total dissolved gas (TDG) at these four USACE dams on the lower Columbia River. The USACE plan for reducing TDG is detailed in the USACE Dissolved Gas Abatement Study and Water Quality Plan (Dec 2003). Two additional TMDLS for the Snake River and Mid Columbia River were approved in 2003 and 2004, respectively. In the year 2010, if TDG standards are still violated, Ecology will reconvene the stakeholders for review and planning for additional actions. Ecology is not planning on assembling a DIP for this TMDL because all potential implementation activities are covered by the USACE plans.

Non-point source implementation:
There are no non-point sources in the watershed that contribute to elevated TDG in the Lower Columbia River.

Point- source implementation:
There are no NPDES permitted point sources in the watershed that contribute to elevated TDG in the Lower Columbia River.

USACE actions to reduce TDG levels must also ensure fish passage improvements required under the 2004 Biological Opinion.

Short term activities include:
- Operations and maintenance actions
- Spill deflectors
- Survival based spill caps
- Divider walls
- Removable spillway weirs

- Other dam specific technology

Long term activities include: removable spillway weirs, bypass improvements, improved operation and maintenance, etc.

Interim and Final TMDL targets:
Maintenance of required spill will be measured at the fixed monitoring stations both in the fore bay and the tailrace of each dam. The TMDL target is to meet the 110% standard, with the waiver for fish spill.

Is water quality improving? Are additional implementation measures needed?
TDG concentrations are dependent on total river water flow, which is regulated by upstream storage dams, and by the structure and operations of each dam. For given river flows, TDG concentrations are expected to decline as operational and structural improvements allow for reduced spill and for lower TDG production by spill.

Short term compliance and the effectiveness of operational implementation actions will be monitored at existing fixed monitoring station sites. Monitoring of long term compliance with load allocations and the effect of structural changes will include an evaluation of previous transect studies and further transect measurements at the end of the aerated zone below each dam. Hourly monitoring is performed, and real time data summaries are posted on the internet.

Colville River
Eastern Regional Office
Pollutant: fecal coliform, dissolved oxygen (DO) and ammonia
Approved:
Colville River DO and ammonia TMDL approved on October 24, 2003
Colville River fecal coliform TMDL approved on July 3, 2003

TMDL Implementation:
Detailed Implementation Plan**:** The permits for the two wastewater treatment facilities serve as the DIP for the DO and ammonia TMDL, since there are no non-point sources of the TMDL parameters. The TMDL advisory committee reconvened in October 2003, and completion of the fecal coliform DIP is expected in March 2005.

Point-source implementation**:**
The Chewelah and Colville WWTPs received fecal coliform, BOD and ammonia WLAs in these TMDLs.

The Chewelah WWTP upgraded its facility in Jan. 2002 and the WLA's for DO and ammonia have been incorporated into their discharge permit. This WWTP is currently meeting fecal coliform standards end-of-pipe.

The Colville WWTP is required to meet a 50% reduction by November 1, 2006. The Colville facility upgrade is expected to be completed in June 2006; the upgrade is expected to yield effluent that complies with all the WLAs in these TMDLs.

Non-point source implementation:
Fecal coliform: An implementation project located along a downstream stretch of the Colville River was installed during the spring of 2003 and used a combination of BMPs. Fencing was constructed to create several pastures in order to use pasture rotation techniques. Seven off-stream watering troughs were installed (which included drilling a well, bringing in power, and pouring cement) in order to make water available to all pastures. The landowner has already noticed a decrease in the amount of cattle tracks along the Colville River, and better pasture utilization. The project was funded with an Ecology 319 grant, and a Conservation Commission grant.

Two Terry Husseman grants from the Coastal Protection Fund were awarded in the spring of 2004 to landowners within the watershed. One grant was awarded to restrict livestock access to approximately 140 acres along the Little Pend Oreille River, which is a tributary to the Colville River. The second grant was awarded so that a winter livestock feeding area along the Colville River can be relocated to an area without surface water drainage. As of December 2004, the fencing along the Little Pend Oreille River was completed. Other implementation efforts have been initiated in the watershed. For example, the Natural Resources Conservation Service has six Wetland Reserve Program contracts and at least two Environmental Quality Incentive Program contracts in the watershed. Moreover, the Stevens County Conservation District has received a grant to conduct additional monitoring and implement additional implementation measures.

No non-point source contributions of ammonia and DO were found during development of the TMDL.

Interim and final TMDL targets:
The interim target is a 60 percent reduction in fecal coliform in five years or less, with attainment of the TMDL targets in ten years (2012). Interim targets were not established for the ammonia and DO TMDL, as the WLAs are being placed directly into the NPDES permits.

Is water quality improving? Are additional implementation measures needed?
Fecal coliform: It's too soon to tell. Additional upstream-downstream water monitoring was completed October 27, 2003 to determine where the fecal coliform bacteria are entering the water. Once all the data have been compiled and land uses analyzed, actions or BMP's can be recommended and implemented. Implementation activities will also likely be initiated late spring or summer 2004 as a result of this year's water monitoring activities.

Ammonia and DO: The 2002 river monitoring results have shown compliance with the TMDL requirements downstream of the City of Chewelah discharge. It is anticipated that the Colville WWTP upgrade will result in water quality standards being met; the upgrade is expected to be completed by July 2006. Since the current WWTP is a lagoon system, there are inherent problems meeting limits when, for example, the lagoons freeze. The WWTP is not currently monitoring for DO (those requirements will be in the next permit), but the ammonia limits are not currently being met.

Dungeness River
Southwest Regional Office
Pollutant: *fecal coliform*
Approved: July 19, 2002

TMDL Implementation
Detailed Implementation Plan: The Dungeness River Bay DIP was completed in October, 2004, and includes the DIP for the Dungeness Bay TMDL, which was approved by EPA in May, 2004.

Point source implementation:
There are no point sources of fecal coliform in the watershed.

Non-point source implementation:
Non-point source implementation has included obtaining trust water rights, piping irrigation ditches, and water conservation efforts. These have all improved flow in the Dungeness, thereby improving water quality concentrations, habitat, temperature, and instream flow over the last several years. Several stream restoration efforts have also improved habitat.

Local agencies and the Jamestown S'Klallam Tribe have done outreach under a variety of funding scenarios for a number of years, even before the TMDLs were begun. Agencies involved include: Clallam County, Clallam Conservation District, Jamestown S'Klallam Tribe, Sequim-Dungeness Water Users, Dungeness River Management Team, DOH, Battelle, USFSW, and Puget Sound Action Team.

Various agricultural practices have been implemented at locations throughout the study area which have been funded by many different programs including Centennial, EQIP, CREP and CRP, salmon funds, Conservation Commission funds, and EPA grants.

Agricultural BMPs have been implemented throughout the area, including farm planning, fencing, riparian restoration, pasture management, manure storage, and gutters and downspouts. A lot of work has been done with a local game farm to improve their management practices, and additional work to keep the management practices in operation.

The Sequim Prairie (including the Dungeness drainage) has an extensive irrigation network and there is an ongoing effort to pipe many of the ditches and eliminate tailwaters. The effort is largely driven by water conservation but is providing significant water quality benefits as well. A piping project in Matriotti Creek was initiated specifically to improve water quality. Irrigators will continue piping problem areas as funding can be identified.

Interim and Final TMDL targets:
No interim targets were established. Final numeric targets are given in geometric mean values and 90th percentile concentrations, with the end goal of meeting the water quality criteria by 2007.

Is water quality improving? Are additional implementation measures needed?

Data analysis shows that Matriotti Creek has made dramatic improvements in fecal coliform levels since the TMDL study was completed. Several sites meet the bacteria target levels set for

the creek and all sites monitored show some improvement. The highest levels of bacteria continue to be seen during the irrigation season (April - September). Local efforts to improve water quality should be commended.

In order to meet the TMDL bacteria target, more effort is needed. While TMDL target bacteria levels are being met upstream in Matriotti Creek at river mile 4.8, they are not being met downstream at river mile 1.9. Downstream improvements in bacteria levels are still needed during the irrigation season. Big improvements in bacteria levels are seen between river mile 0.7 and 0.3, but more improvements are needed to meet the bacteria TMDL targets. At the mouth of Matriotti Creek, a 38% reduction in bacteria levels is needed to meet TMDL targets. This is a significant improvement from the 78% reduction needed four years ago.

Dungeness River currently does not meet TMDL bacteria target levels, but improvements in fecal coliform levels are seen during the irrigation season at river mile 0.8. Improvements in bacteria levels could be due to decreasing bacteria levels in Matriotti Creek. Bacteria levels near the mouth of the Dungeness River at river mile 0.2 continue to remain about the same.

Meadowbrook Creek showed slightly increasing levels of fecal coliform concentrations since the TMDL study was completed and still does not meet fecal coliform standards.

On-going monitoring is being conducted by the Jamestown S'Klallam Tribe and Clallam County.

Gibbons Creek
Southwest Regional Office
Pollutant: fecal coliform
Approved: August 9, 2000

TMDL Implementation:
Detailed Implementation Plan**:** The draft DIP was completed in June, 2004 and will be finalized in 2005.

Point-source implementation**:**
There are no point sources of fecal coliform in the watershed.

Non-point source implementation: The Clark County Health Department has begun implementation of their on-site septic system (OSS) survey to increase maintenance and repair of septic systems in the basin. It is not possible to determine the effectiveness of this program yet, since the program has only been in effect for a few months. Additional BMPs are planned and will be described in the DIP.

The Conservation District has agreed to assist landowners, but as of yet no formal referrals to the district from Ecology have been made. Specific restoration measures have not been identified, since monitoring has not yet identified specific sources. Clark County has developed a stormwater program, including a Watershed Stewards Program. Watershed Stewards are involved in stream restoration activities as well as citizen monitoring projects, including Gibbons Creek. Implementation activities to date have been limited to preliminary pollution source identification.

Interim and final TMDL targets: The final target is the state water quality standard for fecal coliform bacteria of a geometric mean of all samples at each site not to exceed 100 colonies/100mL, and no more than 10% of all samples exceeding 200 colonies/200mL. The interim target is a 50% reduction of fecal coliform by December 2006.

Is water quality improving? Are additional implementation measures needed?
Ambient monitoring conducted by Ecology's Environmental Assessment Program from 2001-2002 indicates that ongoing fecal coliform bacteria pollution in the basin is consistent with previous monitoring results. A change in pollution levels was not anticipated since implementation is still in the preliminary stages.

Using funds provided by the Section 319 grant program, Clark County has established a monitoring resource center, hired a program manager for the resource center, and developed a training program and monitoring equipment. Collection of monitoring data began in April 2004.

Granger Drain
Pollutants: fecal coliform
Approved: December 12, 2001

TMDL Implementation
Detailed Implementation Plan: The DIP was completed in December, 2002.

Point source implementation: NPDES permits for combined animal feeding operations (CAFO) have a "no discharge" requirement.

Non-point source implementation:
Between October 2002 and January 2004, 40 acres of agricultural land were converted from rill to sprinkler irrigation. In addition, all of the watershed's local dairies have developed Nutrient Management Plans and implemented improvements to their waste handling facilities. Funding was provided through assessments, SRF, CDs, EQIP, and other funding sources.

Interim and Final TMDL targets: Both interim and final fecal coliform density targets have been established. The interim target is an average 90th percentile of 510 cfu/100mL, after the irrigation season in 2007. The final target is to meet the Class A fecal coliform bacteria criteria (geometric mean of 100/100 mL, 200/100 mL 90th percentile) after the irrigation season of 2012.

Is water quality improving? Are additional implementation measures needed?
Water quality is improving faster than anticipated. The first Granger Drain effectiveness monitoring report was presented at the January 30, 2004, TMDL workgroup meeting. The monitoring data show that agricultural runoff BMPs have been very successful in reducing fecal coliform bacteria levels in the Granger Drain.

Ecology expects that the TMDL interim target for Grainger Drain will be met during the 2007 irrigation season, and that water quality standards will be met in 2010 (two years earlier than originally forecast). Irrigation season is the critical condition for fecal coliform bacteria; during the non-irrigation season, the Granger Drain is in compliance with the interim target. The Granger Drain has experienced a 58% decrease in fecal coliform bacteria densities since 1998,

with the 90th percentile fecal coliform density decreasing from 1800/100mL in 1998 to 750/100mL in 2003.

The Sunnyside Valley Irrigation District (SVID) Canal was in compliance with State standards during the irrigation season, in both 2002 and 2003. A 65% reduction of the 90th percentile fecal coliform level has occurred since 1998, with fecal coliform density decreasing from 340/100 mL in 1998 to 120/100 mL in 2003 (the 90th percentile water quality standard is 200).

Although it is not water quality impaired, a third waterbody in the watershed (Roza Irrigation District Canal) has also benefited from a 77% reduction in bacterial densities since 1998 (reduction of 90th percentile densities from 190/100 mL to 44/100 mL). Only a small percentage of the total BMP implementation was conducted upgradient of the RID Canal, illustrating that implementation of a few BMPs can effect substantial water quality improvements.

Humptulips River (Upper)
Pollutant: temperature
Approved: August 7, 2001

TMDL Implementation
Detailed Implementation Plan: The DIP was completed in June, 2003

Point source implementation: There are no point sources affecting temperature in the watershed.

Non-point source implementation: The USFS manages approximately 65% of the land, with state, county and private ownership accounting for the remaining 35 %. Olympic National Forest Watershed Analysis Water Quality Restoration Plan (WQRP) identifies restoration opportunities in the Humptulips watershed including required buffers, road inventory and restoration and decommissioning of 93 of the 200 miles of Forest Service Roads in the Upper Humptulips watershed. Since 1999 the Olympic National Forest (ONF) has decommissioned 5.4 miles of roads and drained and stabilized 4.5 miles of roads. In addition to road restoration, the ONF has completed riparian plantings along 0.4 stream miles and placement of large woody debris within 0.9 miles. The ONF is also planning construction of a bridge that includes fish passage and decommissioning of 5.6 miles of roads.

The Grays Harbor Conservation District has funded 130 miles of riparian fencing to exclude livestock from riparian area in order to reserve riparian vegetation and reduce fecal contamination.

The Forest Practices Rules that guide riparian management in the Upper Humptulips will likely improve effective shade conditions.

Interim and Final TMDL targets: Targets are expressed as "percent shade." It is generally expected that it will take 50 years for the riparian vegetation to grow to the required height. Rayonier Timber Company, the largest private industrial landowner, is following the Forest and Fish agreement to meet water quality standards by 2009.

Is water quality improving? Are additional implementation measures needed?

In 2002, the USFS initiated data collection at selected sites within the Upper Humptulips to determine whether road restoration treatments designed to reduce sediment delivery to aquatic systems have been effective. The monitoring design involves multiple-year implementation and includes data collection prior to, immediately after, and one-year following, various treatments to roads. Data collection is still underway, and results will be documented in the monitoring report that is expected in 2004. Ecology is planning to begin effectiveness monitoring at other locations in the watershed in 2013.

Johnson Creek Watershed
Northwest Regional Office
Pollutants: fecal coliform, dissolved oxygen (DO)
Approved: June 2, 2000

TMDL implementation:
Detailed implementation plan: The DIP was completed in December 2003

Point-source implementation: No point sources were found to be contributing to elevated pollutant concentrations.

Non-point source implementation:

- Ecology dairy inspections helped reduce fecal coliform loadings.
- Agriculture inspections
- Local Health Department onsite septic inspections
- Farm plans through Whatcom County Conservation District
- Whatcom County public works flood and drainage district received a $500,000 Centennial Clean Water Fund grant to plant riparian areas
- Dairy practices such as fencing cows out of creeks and manure spraying practices are reducing pollutant loading of fecal coliform and BOD. These types of practices are increasing as a result of Dairy Nutrient Management Plans and Critical Areas Ordinance enforcement as outlined below.
- Critical areas ordinance was set up by Whatcom County planning and development. The Critical Areas Ordinance mandates a 50 or 100 foot buffer of native vegetation on all streams (50 feet for non fish bearing and 100 for fish bearing streams) unless there is an approved farm plan. That ordinance has been useful in eliminating direct animal access issues when the county has enforced the ordinance. The typical procedure is for a complaint to be filed with the County Planning where animals have direct access to streams because the pasture runs to the high water mark. The county compliance officer sends the land owner a referral to the Conservation District. Depending on the resources available at the Conservation District landowners are provided temporary fencing and resources to establish a buffer (typically consistent with NRCS guidelines) on streams while a farm plan is being developed. Development of non dairy farm plans is not currently well funded. The planners are paid out of grants that target specific watersheds but complaints come from across the county creating a situation where some landowners can get farm plans and others will have to wait until funding is available.
- County does inspections and Ecology responds to a referral for agricultural problems.

Interim and final TMDL targets:
The water quality targets developed in the TMDL for fecal coliform and BOD are expected to be met no later than June, 2008. Based on the 2008 goal, quarterly water quality targets have been set.

Is water quality improving? Are additional implementation measures needed?
Water quality is improving. Water quality standards for fecal coliform were achieved in 2002 in Johnson and Sumas Creek, where concentrations of fecal coliform bacteria have been reduced by up to 80%. Fecal coliform levels are decreasing according to the DIP schedule in Squaw Creek, but slower than anticipated in Pangborn Creek. Northwest Indian College performs on-going monitoring at stations throughout the basin, which provides data for the on-going evaluation of TMDL effectiveness. Because the dissolved oxygen and fecal coliform impairments have similar sources, BOD is not currently being monitored. When the bacteria targets are met, however, DO will be evaluated for compliance with the TMDL targets.

Little Klickitat
Pollutant: temperature
Approved: June 26, 2003
TMDL Implementation
Detailed Implementation Plan: The DIP is under development and is expected to be completed in 2005.

Point source implementation: The NPDES permit for the City of Goldendale WWTP (WA-0021121) expired on June 30, 2003. When the permit is reissued it will incorporate the WLA as well as those monitoring requirements developed as part of the detailed implementation plan.

Non-point source implementation:
Funds provided by the USDA's conservation Reserve Enhancement Program (CREP) and Continuous Conservation Reserve Program (CCRP) were used for riparian plantings, bank stabilization and animal fencing. Organizations continuing to work on non-point source implementation include State Fish and Wildlife, Americorps, Northwest Service Academy and WA Conservation Corps.

Interim and Final TMDL targets:
The TMDL targets are expressed as "percent effective shade" because increasing riparian shade is the most effective change landowners and managers can make in order to cool stream temperatures. The TMDL goal is to meet the temperature water quality standards in 80 years. The TMDL did not set interim numeric targets for the Little Klickitat River Temperature TMDL. Ecology will monitor the interim effectiveness of the TMDL in 4 ways:

- Tracking stream temperature
- Monitoring physical parameters known to affect stream temperature
- Tracking implementation projects and their effectiveness
- Track temperature dependent biota (macroinvertebrates and salmonids)

Is water quality improving? Are additional implementation measures needed?
It is too early to tell if the water quality is improving. The DIP will require tracking of BMPs in the next 5 to 10 years. After plantings are established and BMPs are put in place effectiveness monitoring will be done by Ecology and local citizens.

Nooksack River
Northwest Regional Office
Pollutants: fecal coliform
Approved: August 8, 2000

TMDL implementation:
Detailed implementation plan: The DIP was completed in March 2002

Point-source implementation:
WLAs for the following 3 wastewater treatment plants (WWTP) were incorporated into the NPDES permits between 2000 and 2002: Everson, Ferndale, and Lynden.

The Everson and Ferndale WLAs were incorporated into the facility NPDES permits in 2001 and 2004, respectively. Both the Everson and Ferndale WWTPs were in compliance with the WLA prior to receiving the new NPDES permit limitations. The City of Lynden received a compliance schedule at the last permit renewal, with limits reduced to one half of the technology based limits. The compliance schedule ended in June, 2003, and the discharge limitations are now consistent with the WLA of 28 CFU.

Concentrated Animal Feeding Operations (CAFOs) were given an allocation of zero.

Non-point source implementation:
- Agriculture inspections
- Local Health Department onsite septic education and inspections
- Farm plans through Whatcom County conservation district
- Whatcom County public works flood and drainage district planting riparian areas with a Centennial Clean Water Fund grant for $500, 000.
- Dairy practices such as fencing cows out of creeks, and improved manure spraying practices
- 175 out of 182 dairies met the nutrient management plan certification deadline on Dec 31, 2003

Interim and final TMDL targets:
Quarterly targets have been established for each tributary (see Appendix B in the Detailed Implementation Plan) with the goal of meeting water quality standards by July 2005.

Is water quality improving? Are additional implementation measures needed?
Yes, water quality is improving. All interim targets were met during the last few quarters. In October 2003, reductions in bacteria levels resulted in the reopening of the majority of the Lummi shellfish beds in Portage Bay; these shellfish beds were restricted in 1998 by the Washington Department of Health due to unsafe levels of fecal coliform bacteria. Northwest Indian College performs on-going monitoring at stations through out the basin. This effectiveness monitoring each quarter is used to prioritize implementation activities.

North Creek
Northwest Regional Office
Pollutant: fecal coliform
Approved: August 2, 2002

TMDL implementation
Detailed implementation plan: The DIP was completed in September 2003.

Point-source source implementation: The Cities of Everett, Mill Creek and Bothell, and Snohomish County have received wasteload allocations for their municipal separate storm sewer systems (MS4s). The North Creek DIP specifies the actions to be required by the municipal stormwater permits when they are either reissued (Phase I) or written for the first time (Phase II). Required actions include water quality monitoring and the development of "Bacterial Pollution Remediation Plans." Ecology anticipates that the revised Phase I and new Phase II municipal stormwater permits will be drafted in the fall of 2004. Some entities have already begun monitoring, which is detailed further in the non-point implementation section below.

Non-point source implemenation:
Many of the non-point implementation activities discussed below will also reduce the pollutant loading from point source stormwater.

- Water quality characterization studies have been initiated by the Cities of Bothell, Mill Creek, Everett, and Snohomish County. The results of these studies will help these local governmental organizations focus their implementation activities in very specific areas.
- Pet waste education / collection stations been installed in numerous locations throughout the watershed by the Cities of Mill Creek, Snohomish County, the University of Washington Bothell/Cascadia Community College, and Ecology.
- The City of Mill Creek has contracted with a private consultant to prepare a riparian restoration project along the main stem of North Creek that will increase the riparian buffer.
- The City of Everett has installed one flow augmentation well and gained Ecology Water Resources Program approval to pump water into North Creek during low flow periods. Pumping is scheduled to begin in 2004. Funding is currently being sought for several additional wells.
- Snohomish County is mapping native protection areas in North Creek, and is working with citizens in selected areas to improve stormwater quality through Low Impact Development (LID) retrofits. LID and other activities are expected to include the installation of rain gardens, rain barrel water dispersion systems, soil augmentation, and the use of compost berms.
- Public education program in the Cities of Bothell, Mill Creek, Everett include installation of water quality and salmon-related education s signs along rivers and creeks, organized riparian restoration projects, salmon friendly car wash kits, and publishing education material in local newspapers and in utility bills.
- Snohomish County funds a south county basin steward, streamside landowner education meetings, and a stream keepers program.
- Snohomish County water quality data is available to the public on-line at http://198.238.192.103/spw_swhydro/wq-search.asp
- Adopt-a-Stream Foundation (AASF) has initiated a targeted outreach program for streamside landowners in North Creek not addressed by other programs (Bothell, parts of

Snohomish County). Streamside landowners will be contacted through mailings and a door-to-door campaign. AASF staff will follow up with recommended corrective actions as needed, and will be able to offer landowners funding for BMP implementation such as improved manure management, improved stormwater management, and improved riparian buffers.

- Mill Creek Golf Course (MCGC): the MCGC is working with the AASF to improve riparian buffers and the pollution filtering capacity of riparian areas within its boundaries.

Interim and final TMDL targets:
Numeric, in-stream fecal coliform targets have been set at three locations in the watershed. Ecology anticipates that if state and local coordination proceed as expected, water quality standards will be met by December 2008. Filbert, Tambark and Penny Creeks are anticipated to be achieving the standards by 2006.

Is water quality improving? Are additional implementation measures needed?
It's too early in the implementation process to evaluate the improvement of water quality in the North Creek watershed. In addition, this was a relatively early urban TMDL and additional source identification is needed during the early stages of TMDL implementation to help target specific pollution sources and refine corrective action strategies. Ecology plans to conduct effectiveness monitoring in this watershed in conjunction with the Phase I and II stormwater monitoring that will be conducted by local governments.

Quincy Irrigation Drain
Eastern Regional Office
Pollutants: BOD, ammonia-nitrogen, fecal coliform
Approved: October 7, 1998

TMDL implementation:
Detailed implementation plan: The NPDES permit serves as the DIP for this TMDL because a single point source was found to be the sole source of impairment

Point-source implementation: The City of Quincy owns an industrial wastewater facility that treats wastewater from a potato and vegetable processor, which is the sole point source of impairment in the Quincy Irrigation Drain. The WWTP received Waste Load Allocations (WLA) for BOD, ammonia and fecal coliform in their Industrial NPDES permit (WA-0021067) on May 2, 2001. The NPDES permit requires that the facility comply with the fecal coliform and dissolved oxygen WLA in September, 2005. Compliance with the ammonia WLA has been required since 2002.

The City of Quincy industrial WWTP was upgraded from a single aeration basin to an SBR system that is designed to meet the ammonia limits. The upgrade was fully on-line in February 2002. The upgraded industrial WWTP is not, however, meeting ammonia limits. A compliance schedule has been added to the permit to require the City (owner) and Earth Tech (operator) to inform Ecology how the limits will be met, and when plans and specifications will be submitted for the upgraded needed to meet the limits.

A draft Use Attainability Analysis (UAA) was submitted to Ecology in September, 1999, by the City of Quincy with a request to change the designated uses for the drains that receive the

wastewater from their treatment plant. The receiving water is a wasteway that is part of the federal Columbia Basin Irrigation Project. Ecology provided comments on the UAA to the City of Quincy in 2003. The UAA requests a the removal of all aquatic life uses from the receiving water.

Interim and final TMDL targets:
The final TMDL targets are the WLAs, which have been integrated into the NPDES permit.

Is water quality improving? Are additional implementation measures needed?
It is not known if water quality is improving. The City monitors the wasteway upstream from the discharge on a monthly basis.

Salmon Creek
Southwest Regional Office
Pollutants: fecal coliform, turbidity
Approved: April 5, 2001

TMDL Implementation:
Detailed Implementation Plan**:** The draft DIP was completed in September, 2004, and will be finalized in 2005.

Point-source implementation**:** There are no point sources of fecal coliform / turbidity in the watershed.

Non-point source implementation:

- Based on an Army Corps of Engineers analysis of limiting factors for salmon, Clark County is buying the greenway in the lower watershed.
- A Centennial Clean Water Fund (CCWF) grant for $350,000 was given to Clark County Health District in 2003 for on-site septic operation, maintenance and monitoring. By December 2005, 950 systems will have been inspected. The Health Department is holding public hearings and workshops to inform all on-site owners in the watershed about their responsibilities for maintaining a functioning system.
- The Clark Public Works phase 1 stormwater permit includes an education, sampling and monitoring program.
- The following projects were completed by the Clark County Storm Water Program from 2001 to 2003:
    - ❖ Salmon Creek and Highway 99 Stormwater Treatment Facilities: this $141,000 project is collecting and providing treatment of stormwater runoff from Highway 99 and nearby commercial and industrial properties south of Salmon Creek. Stormwater enters an underground vault where it is treated by 26 "filter cartridges" before it discharges into Salmon Creek.
    - ❖ Cougar Creek Infiltration Project: this $340,000 project is a pilot program for stormwater runoff improvements in the Cougar Creek Basin, which is heavily developed and lacks sufficient water treatment. Stormwater treatment manholes and 29 infiltration dry wells have been built to capture and infiltrate stormwater for two-year storm events.

- ❖ Interstate 205 Stormwater Treatment Retrofit at Salmon Creek: this $180,000 project is a joint County and Washington Department of Transportation effort which captures and treats stormwater before it is discharged to Salmon Creek.
- From 2004-2006, Clark County will install detention ponds, swales, water quality filters, and retrofit their stormwater facility.
- Clark Public Utilities has an agreement with Ecology to turn off wells if it looks like it will be a dry season.
- CCWF grant for $250,000 was given to Clark CD in 2003 for a small farms project to provide workshops on septics and stream restoration. 8,813 native trees and shrubs will be planted in 2004 to enhance fish and wildlife habitat. These plants will help protect 3,274 linear feet of Salmon Creek. 3,473 linear feet of livestock exclusion fence was constructed to keep livestock from entering the waterways.
- Hazel Dell sewer district is increasing sewer lines to get homeowners off septic systems.
- Lower Columbia Fish Recovery Board is funding streamside restoration projects.
- Erosion Control Certification: Beginning January 1, 2001, County code requires all development contractors to be trained in erosion and sediment control by an organization recognized by the Community Development Department Director. The program has certified 770 people in Clark County as of the end of 2002.
- During 2002 Clark County Public Works Building Division has conducted 18,633 inspections of building sites in Clark County. 814 correction orders and 36 stop work orders were issued. These were for the entire county but Salmon Creek is a large percentage of this area.
- Clark Public Utilities has a continuing program to address water quality problems on Salmon Creek. During the past few years they have installed over 10 miles of livestock exclusion fencing and planted over 15 acres of riparian area.

Interim and final TMDL targets: Fecal coliform standards are the final targets for fecal coliform. The tributaries are divided into 9 sub-basins with target percent reductions of fecal coliform for wet and dry seasons. The final turbidity target is no more than 5 NTU over background.

Is water quality improving? Are additional implementation measures needed?
We don't know. Clark Public Utilities began an ambient monitoring program in 1995. An intensive review of this data has not been done. Given the average population growth in the watershed of about 10% a year for the past decade it will not be surprising if little change has been shown. Ecology will be doing an intensive local data review in the summer of 2004.

Skagit River (Lower)
Northwest Regional Office
Pollutants: fecal coliform
Approved: September 1, 2000

TMDL Implementation:
Detailed implementation plan: The estimated DIP completion date is March, 2005.

Point-source implementation: The Wasteload Allocations for all WWTPs in the basin (Big Lake; Mount Vernon; Sedro-Woolley; and Burlington) were set at the current technology-based permit limits. The NPDES permits therefore already contain permit limits that are equivalent to the WLAs in the TMDL.

The City of Mount Vernon has a 1996 Consent Order from Department of Ecology to meet the WAC 173-245 goal of one overflow per year average from Combined Sewer Overflows (CSOs) by January 2, 2015. The NPDES permit for the Mount Vernon WWTP references this Consent Order and requires an annual report on compliance.

The City has made excellent progress in addressing the requirements of the Consent Order. It constructed a large Central Interceptor to collect and transport combined sewer overflows to the existing wastewater treatment plant, which had been upgraded to accommodate growth to the year 2011. As a result of this and other infrastructure improvements, annual discharges from CSOs, which previously averaged 116 million gallons (MG) annually, were reduced to 3.8 MG in 2002. The City is continuing to make the additional infrastructure improvements necessary to meet the terms of the Consent Order by 2015.

Non-point source implementation:
The Skagit Conservation District is implementing agricultural BMPs, including developing farm plans and assisting farmers with specific farm plan elements such as installing fencing to exclude animals from streams. In the Nookachamps Creek sub-watershed, all five remaining dairies (out of nine operating at the time TMDL data were collected in 1994-1995) have approved farm plans. To educate small farm owners, the Conservation District will run a series of evening small farm workshops (in this sub-watershed) in fall 2004 that will include information on manure management, conserving soil and other measures to protect water quality. Typically 20 to 40 individuals attend these workshops.

Interim and final TMDL targets:
No interim targets were established in the TMDL. Final targets include targets for the upstream and downstream boundaries of the mainstem TMDL area.

Is water quality improving? Are additional implementation measures needed?
Yes, water quality is improving. The Mount Vernon CSO reductions have been achieved. One year (2000) of monthly water quality monitoring indicated that the fecal coliform targets for the Main stem Skagit River upstream boundary above Sedro Woolley (geometric mean of 6/100mL, and 90th percentile of 80/100mL) have been achieved. This site will be monitored again for one year starting in July 2005.

Recent monitoring data for the Nookachamps subwatershed, however, indicates this creek system still has fecal coliform problems. The Department of Health marine monitoring data for South Skagit Bay, which receives discharge from a number of coastal sloughs and the South Fork Skagit River, indicates that these marine waters are still receiving too much fecal coliform pollution from fresh water sources. It is hoped that the County monitoring program will help Ecology identify sources.

No recent water quality data are available for Fisher and Carpenter Creeks or the North Fork Skagit River. To address the absence of monitoring data, Skagit County Public Works was awarded a Centennial Grant in 2004 for a monitoring program that includes Fisher and Carpenter Creeks and the receiving waters to which they discharge: Hill Ditch, North Fork below Rexville Pump Station, and South Fork Skagit River at Conway.

The City of Burlington developed the Gages Slough Management Plan in 1998 and is now revising the plan. The plan's goal is to enable the slough, which runs through a commercial area

of Burlington and receives much of the city's stormwater, to meet water quality standards, restore wetlands, and educate the public about protecting water quality and wildlife. Besides many other measures undertaken, the City has entered an interlocal agreement with the County to begin managing property on the lower portion of the slough as a wetlands/stormwater treatment system.

Effectiveness monitoring (likely to be scheduled for 2008) will also be conducted by Ecology, to allow for the Detailed Implementation Plan (in development at this time) to take effect. To help determine when effectiveness monitoring will be appropriate, the DIP includes an annual review by Ecology of new water quality data and agency performance of implementation measures.

Skokomish River
Pollutant: fecal coliform
Approved: October 16, 2001

TMDL Implementation
Detailed Implementation Plan: The DIP was completed in February 2003.

Point source implementation: There are no point sources of fecal coliform in the watershed.

Non-point source implementation: The Mason Conservation District has worked with landowners on agricultural BMPs. Thousands of feet of riparian fencing and well over 100 acres of riparian plantings have been installed. Upland practices have also been implemented. The riparian work has largely been done under Centennial funds while the implementation of upland practices has been federally funded. Partners working on implementation of this TMDL include: Mason Conservation District, Mason County, Skokomish Tribe, valley residents, DFW, DOH.

Interim and Final TMDL targets: Fecal coliform targets were developed to achieve the class AA water quality standards in the Skokomish River (geometric mean 50/100mL, and 90th percentile 100/100mL), and the marine standards (geometric mean of 14/100 mL, and 90th percentile of 43/100mL). An interim target established in the DIP for the Skokomish River at the Hwy 106 bridge of 23 col/100ml for the Geometric Mean Value (GMV), and 97 col/100ml for the 90th percentile concentration; Ecology hopes to meet this interim target by December 2004, and hopes to achieve compliance with all targets in the TMDL by December 2006.

Is water quality improving? Are additional implementation measures needed?
Water quality is improving. Monitoring data collected by the Skokomish tribe indicate that waters are currently meeting the TMDL targets at all four compliance points. Ecology's Environmental Assessment Program will begin more rigorous effectiveness monitoring during FY 05.

Snohomish Estuary
Northwest Regional Office
Pollutants: BOD, ammonia
Approved: August 25, 1999

TMDL Implementation:
Detailed Implementation Plan: The NPDES permits serve as the DIPs for this TMDL.

Point-source implementation:
NPDES activities at each of the six facilities that received WLAs in the Snohomish Estuary TMDL are discussed below:

Tulalip Landfill, WA-0025739. The Tulalip Landfill was permitted by EPA in 2/18/1986 and the site has been capped since that time.

Snohomish WWTP, WA-0029548 (permit issued 4/14/2000). The City of Snohomish's NPDES permit requires compliance with WLA limits beginning in July, 2004. The Snohomish treatment plant is unlikely to meet the ammonia limits without additional WWTP improvements. A facility plan for treatment plant improvements has been submitted to Ecology for review. Construction of the plant improvements, and/or a reallocation of loads based on the removal of Everett's and Marysville's effluent (discussed below), will bring Snohomish into compliance with the TMDL.

Lake Stevens WWTP, WA-0020893 (permit issued 4/07/2000). The Lake Stevens Sewer District's NPDES permit includes WLA limits for BOD and ammonia. The District has completed WWTP improvements and has been in compliance with their WLAs for approximately two years.

Marysville WWTP, WA-0022497 (permit issued 4/07/2000). The City of Marysville is currently constructing phased improvements to their WWTP facility, along with a connection to the Kimberly-Clark/Everett outfall line to Port Gardner Bay. During the low flow months Marysville plans to pump all of its effluent to the deep water outfall. Marysville's NPDES permit requires compliance with WLA limits by July 2004; however, construction delays will prevent them from meeting this date by a few months (anticipated project completion in September 2004).

Everett WWTP, WA-0024490 A substantial portion of the City of Everett's discharge will soon be diverted to Port Gardner Bay during the critical low flow months. The City of Everett and the Kimberly Clark Company have entered into a contractual agreement governing the joint use of a deepwater outfall into Port Gardner Bay. The effluent transfer and outfall facilities are currently scheduled for completion in September 2004. Everett anticipates pumping up to 16 mgd to the outfall once the facilities are complete. In the year 2010, Everett anticipates increasing the effluent flow capacity to the outfall to 24 mgd and eventually increasing the capacity to 32 mgd. Everett is expected to meet its WLA limits once the new outfall line is complete. Everett's NPDES permit has been administratively extended since 1997 and will be reissued in late 2004. The total WLA will be allocated to the "north" outfall and all of the "south" outfall discharge will go to Port Gardner Bay.

Non-point source implementation: The nonpoint load allocations were set at existing conditions (i.e., no reductions were proposed for nonpoint sources). It should be noted, however, that implementation of the Lower Snohomish Estuaries Fecal Coliform Bacteria TMDL is expected to aid in the reduction of nutrient inputs from nonpoint sources and is discussed elsewhere in this document.

Interim and final TMDL targets:
BOD and ammonia effluent limits were developed for the point sources so that water quality standards for DO will be met during the critical period (July through October) in Snohomish Estuary.

Is water quality improving? Are additional implementation measures needed?
As discussed above, not all controls are in place yet. Ambient and possible effectiveness monitoring will be considered during Ecology's basin-specific scoping processes for this WRIA, which will occur in 2005 and 2010.

Snohomish Tributaries (Lower)
Northwest Regional Office
Pollutant: fecal coliform
Approved: August 8, 2001 (additional tributaries approved on April 29, 2002)

TMDL Implementation:
Detailed implementation plan**:** The DIP was completed in June 2003.

Point-source implementation: The Cities of Everett, Marysville, Arlington, Snohomish, and Monroe received wasteload allocations for their municipal separate storm sewer systems (MS4s). The DIP specifies the actions to be required by the municipal stormwater permits when they are either reissued (Phase I) or written for the first time (Phase II). Required actions include water quality monitoring and the development of "Bacterial Pollution Remediation Plans." Ecology anticipates that the revised Phase I and new Phase II municipal stormwater permits will be drafted in the fall of 2004. Bacterial contributions from municipal stormwater will be controlled through Snohomish County's Phase I Municipal Stormwater Permit in unincorporated Snohomish County. Phase II stormwater permits will be issued to the Cities of Marysville, Arlington and Lake Stevens.

Non-point source implementation:
Many of the non-point source implementation activities discussed in this section will also reduce the pollutant loading from point source stormwater.

- Water quality characterization studies have been initiated by the Cities of Marysville, Arlington, Lake Stevens, Snohomish County, French Slough flood control district, Lake Stevens Drainage Improvement District. The results of these studies will help these local governmental organizations to focus their implementation activities in very specific areas (e.g. City of Marysville's focus on Munson Creek).
- Pet Waste Education / collection stations have been installed in numerous locations throughout the watershed.
- Snohomish County funds two basin stewards that work in the Snohomish Tributaries area, holds Streamside landowner outreach meetings, and a stream keepers program.

- Ecology's Centennial grant is funding an effort by Snohomish County to identify pollution sources along the main stem of the Snohomish River, as well as assesses salmon habitat. Ecology is also providing Centennial Clean Water Funds to support the "Animal Waste Control Program."
- County water quality data is available to the public on-line at http://198.238.192.103/spw_swhydro/wq-search.asp
- The Snohomish Conservation District (CD) is using Centennial funds for development of farm plans, BMP implementation (fencing, riparian plantings, manure management), and water quality monitoring in Swamp Creek, Little Bear Creek, Quilceda and Allen Creeks.
- French Creek: The Snohomish CD is conducting a two-phased project that involves (1) characterizing the water quality of a portion of the Lords Hill area of French Creek and (2) conduct a multi-faceted outreach effort (workshops, door-to-door campaign) to further identify pollution sources and implement any needed BMPs. The project will conclude by measuring both water quality and community response to this type of outreach approach, and the number of problems found and resolved.
- The Snohomish CD will work with the successful "Horses for Clean Water" organization to educate 4H class attendees on water quality issues.
- The Snohomish Health District has received an Ecology Centennial Clean Water Grant to complete its septic system database and education outreach program development. Upon completing the development of its database, it will target areas for education on operation and maintenance of on-site septics.
- The Allen/Quilceda Watershed Action (A/QWA) Team is a group of local government officials and citizens share resources on watershed issues (Cities of Arlington, Marysville, Snohomish Conservation District, Ecology, Snohomish County, citizen/local teacher, Adopt-a-Stream Foundation). The group's primary outreach activities are to educate the public and local schools and to sponsor riparian cleanup efforts.
- The Stillaguamish/Snohomish Task Force participates heavily in A/QWA Team and Woods Creek Coalition activities and is the key organizer for associated riparian restoration projects. The task force has coordinated riparian restoration activities in the cities of Snohomish, Monroe, Arlington, and Marysville and in Snohomish County along Catherine Creek (Pilchuck) and Woods Creek.
- Woods Creek Coalition educates the public, including local schools, on water quality and the need for riparian restoration, and is focusing on the area surrounding Richardson Creek.

Interim and final TMDL targets: Numeric, in-stream fecal coliforms targets have been set at 24 locations throughout the watershed. Ecology anticipates that if state and local coordination proceed as expected, 75% of all sampling stations will meet water quality standards by December 2005. If implementation resources remain at current levels, the Snohomish River Tributaries will be meeting bacteria water quality standards within 8 years of TMDL approval (2009).

Is water quality improving? Are additional implementation measures needed?
It is too early in the implementation process to evaluate the improvement of water quality in most locations. Local jurisdictions will be required to monitor as part of their Phase I and Phase II stormwater permits, which will assist in determining TMDL effectiveness in the future. One area Ecology is monitoring closely is the Upper Allen Creek Watershed. Ecology began performing monthly bacteria monitoring in the Upper Allen Creek basin in September 2003--insufficient data exists to determine long term improvement, but geometric mean bacteria levels have clearly improved over the past 9 months. Monthly monitoring of 8-11 additional sites has not revealed any consistent hot spots. Long term seasonal data analysis shows dry weather

concentrations to be increasing while wet weather values have fluctuated up and down. Wet weather values are now improving.

South Prairie Creek Watershed
Southwest Regional Office
Pollutants: temperature, fecal coliform
Approved: June 26, 2003

TMDL Implementation
Detailed Implementation Plan: Completion of the DIP is expected in 2005.

Point source implementation: Two WWTPs received WLAs in this TMDL: the City of Wilkeson, WA-1123281, and the City of South Prairie Creek, WA-0040479. The fecal coliform and temperature WLAs will be incorporated into these two NPDES permits when they are reissued in 2005. The WLAs for fecal coliform are equivalent to current discharge limits. A WLA was also developed for the Pierce County Storm water permit, WASM11002; this permit will be reissued in 2005 or 2006.

Non-point source implementation:
Through the Carr fencing project in Spiketon Ditch, the WA Conservation Crew built 4000 feet of field fence with CCWF ($9,000) and Pierce CD funds. An SRF board grant is being pursued to purchase the old Inglin dairy. Pierce CD will submit a Centennial application for funds to address temperature in South Prairie Creek through streamside plantings. In addition, the following activities are planned to reduce fecal coliform concentrations:

- Dairy and non-dairy farm plans
- Critical Area Ordinances
- Stormwater management
- On-site septic evaluations.

To decrease in-stream temperatures, load allocation for "effective shade" were set at the maximum potential effective shade that will occur from mature riparian vegetation. Planned activities to improve in-stream temperature include the Pierce County Critical Areas Ordinance, which requires a 150 foot buffer of undisturbed natural vegetation along South Prairie Creek. In addition, the following management activities are recommended in the TMDL:

- The riparian reserves in the Northwest Forest Plan for U.S. Forest Service land
- The riparian prescriptions in the Forests and Fish Report for all perennial streams on privately owned forest land
- Voluntary retirement of existing water rights and cessation of further water withdrawals

Interim and Final TMDL targets:
Reductions in fecal coliform concentrations are expected by December 2004, and South Prairie Creek is expected to meet fecal coliform water quality standards by June 2008. It is expected that it will take at least 80 years to achieve final temperature targets because of the need to establish tree heights of 120 to 180 ft for effective shade.

Is water quality improving? Are additional implementation measures needed?
It is too soon to tell if water quality is improving. Pierce CD is working on a plan to use Stream Team and some trained volunteers to do monitoring. The Pierce County Conservation District

applied for assistance from the FY 2005 Centennial, Section 319 and SRF to continue source identification monitoring. Post DIP monitoring has not yet been performed and a schedule will be identified in the DIP when completed in 2005.

Spokane River
Eastern Regional Office
Pollutant: metals (cadmium, lead and zinc)
Approved: August 25, 1999

TMDL implementation:
Detailed implementation plan: The NPDES permit will serve as the DIP for this TMDL because point sources are the sole source of water quality impairment. Although Ecology had planned to incorporate the WLAs into NPDES permits in 2004, reissuance of the NPDES permits may be delayed until the dissolved oxygen TMDL is completed.

Point-source implementation: Concentration based wasteload allocations from the TMDL will be incorporated into the following NPDES permits:

Liberty Lake POTW, WA-0045144
Kaiser Aluminum, WA-0000892
Inland Empire Paper, WA-0000825
City of Spokane POTW, WA-0024473

The reduced permit limits will be met through pre-treatment and improved treatment. Ecology has ambient monitoring stations at the state line and in Riverside State Park.

Non-point source implementation:
There are no non-point sources of cadmium, lead and zinc in the Spokane River in Washington.

Interim and final TMDL targets:
The final targets are the WLAs established for point source discharges.

Is water quality improving? Are additional implementation measures needed?
Not yet. The Spokane River is impacted by point and non-point sources of pollution in Idaho. Water quality standards won't be met on the Spokane River in Washington until point and non-point sources of pollution in Idaho are reduced and Washington water quality standards are met at the Idaho –Washington border.

Teanaway River
Pollutant: temperature
Approved: January 29, 2002

TMDL Implementation
Detailed Implementation Plan: The DIP was completed in February, 2003.

Point source implementation: There were no point sources that received WLAs in this TMDL.

Non-point source implementation: Bonneville Power Administration (BPA) funded the installation of sprinklers in most of the valley. Riparian restoration, including tree planting for bank stabilization and shade, was done by the Kittitas County Conservation District through agreements with landowners. Information on implementation has been included in local newspapers, and workgroup members have been meeting with community members. Barbs have been installed to reduce erosion. Tree revetments and large woody debris will be installed to catch sediment, oxygenate water and increase salmon habitat. Alternative irrigation techniques increase flow 7 cubic feet per second in the mainstem.

Interim and Final TMDL targets: The final target for this TMDL is that natural conditions for temperature be achieved by 2080. Natural conditions have been defined by "site potential shade," which includes the shade afforded by mature and healthy streamside vegetation, as well as by the reduced channel width to depth ratio associated with streams in near natural conditions.

Interim targets were not established for this TMDL. The implementation schedules found in the detailed implementation plan, however, do identify flexible annual goals for increased bank stabilization. Water temperatures and stream shading will be monitored over time, and the data trends (which should show cooler water and more stream shading) will measure progress as we move toward the final TMDL target.

Is water quality improving? Are additional implementation measures needed?
Increased salmon returns can be an indication of improved water quality; in 2002, fish biologists counted 110 spring chinook salmon redds in the Teanaway basin. The average since 1981 has been only three per year. Ecology will perform effectiveness monitoring in 2009.

Union River
Northwest Regional Office
Pollutant: fecal coliform
Approved: August 2, 2002

TMDL implementation:
Detailed implementation plan**:** The detailed implementation plan was completed in August, 2003 and implementation is underway.

Point-source implementation: No point sources were found to be contributing to elevated pollutant concentrations.

Non-point source implementation:

- The Upper Union River Restoration Project (UURRP) used Ecology's Cenntenial grants funds to inspect over 180 properties with on-site septic systems. Six failing systems were identified and were corrected. The UURRP also included watershed education outreach and public workshops on small farms BMPs and on-site system maintenance.
- One small farm owner in the Upper Union watershed, where a confirmed water quality violation was identified, is working with Kitsap Conservation District to correct contaminated discharges. Water samples coming from this farm have shown significant improvement since best management practices have been implemented there. A pond that was connected to the stream was filled and no longer supports ducks and geese. A lower

field that remains wet for the majority of the year has been removed from grazing and is being planted in blueberries. Native shrubs have been planted to protect the stream from Canada goose activity and provide filter vegetation.

- The Lower Union River Restoration Study (LURRS) is conducting a monthly sampling and bacteria source identification project in the Lower Union River watershed. Having started less than one year ago, the LURRS project is not as far along as the Upper Union project. However, two failing on-site systems have been identified in the Lower Union River watershed and are in the process of being corrected.

The Lower Hood Canal Watershed Implementation Committee (LHCWIC) is the most active watershed group in the area and is reviewing the status of the TMDL twice-annually. They will assist Ecology's evaluation of current monitoring data and will make recommendations for actions resulting in the Union River meeting water quality standards for bacteria by 2007.

Interim and final numeric targets:
Ecology anticipates that if the water quality programs and projects proceed as expected, all sampling stations with the Union River watershed will be meeting water quality standards by December, 2007. Final numeric targets were established at four stations on the Union River and one station on Bear Creek, a tributary to the Union River.

Is water quality improving? Are additional implementation measures needed?
Yes, water quality is improving. A portion of the Hood Canal shellfish beds (122 acres) near the mouth of the Union River reopened in 2004 due to a reduction in fecal coliform levels. These reductions were achieved through the repair of several large septic systems, including a public system at Belfair State Park. In addition, implementation of BMPs that limit livestock access to streams, and riparian planting along small stream tributaries that cross horse pasture land are resulting in improved water quality in the upper portions of Union River.

Interim targets for 90th percentile bacteria samples are being met at station UR4 (RM4.5 to headwaters). Water quality at stations 'UR5 Bear' and 'UR3 River' have improved to geomeans of 13 and 57 cfu/100 mL, respectively. Sites below River Mile 1.8 do not yet show improvement. Source identification and correction are still underway in the lower watershed, and Ecology expects water quality data to reflect improvements in water quality as these improvements continue.

White River (Upper)
Southwest Regional Office
Pollutants: sediment, temperature
Approved: August 11, 2003

TMDL Implementation
Detailed Implementation Plan: The DIP is scheduled for completion in 2005.

Point source implementation: There are no point sources of sediment and temperature in the watershed.

Non-point source implementation: The USFS Watershed Analysis/WQRP, the Forest Plan and the Crystal Mountain resort management plan will identify implementation strategies in the DIP. Implementation activities for private timberlands are covered by the Forest and Fish Agreement.

Interim and Final TMDL targets:
Sediment load allocations were set by subwatershed with interim target reduction of 60 % in the next 10 years. Temperature load allocations are defined by shade curves. Shade curves indicating system potential effective shade are used as a surrogate measure for the load allocations. The TMDL addresses system potential shade through the use of riparian reserve protective measures, and the restoration of natural levels of sediment delivery along with expected restoration of channel morphology. It does not specify a timeframe for meeting temperature water quality standards; monitoring, however, will help elucidate the answer to this question

Is water quality improving? Are additional implementation measures needed?
It is too early to tell if the water quality it improving. Effectiveness monitoring will be done by Ecology in partnership with the USFS.

Wind River
Pollutant: temperature
Approved: August 8, 2002

TMDL Implementation:
Detailed Implementation Plan**:** The final DIP was completed in May, 2004.

Point-source implementation**:** There are no point sources affecting temperature in the watershed.

Non-point source implementation: The Gifford Pinchot National Forest Wind River Watershed Water Quality Restoration Plan identifies restoration opportunities in the watershed including slide repair, buffers, and riparian improvements. This plan covers over 90% of the land within the watershed so TMDL implementation is fundamentally based on the actions, which the Forest Service will take, based on the Plan. Culverts have been removed and replaced, 81 miles of roads have been decommissioned, and 5,000 acres have had riparian plantings of western red cedar and Douglas fir.

The Wind River Watershed Council meets monthly to identify projects for federal and private timberlands. Members of the Wind River Watershed Council include Skamania County Public Works, USFS, Longview Timber Co., Underwood CD, USFWS, WDFW, Ecology, and USGS Cook Station staff.

Interim and final TMDL targets: Targets are expressed as increases in percent shade, which are directly related to the temperature reductions required to meet water quality standards. The goal is to obtain mature riparian vegetation of 160 foot tree heights in 50 years.

Is water quality improving? Are additional implementation measures needed?
We don't know. USGS is monitoring the watershed and an assessment of project effectiveness in the watershed will be done in 2010.

Yakima River (Upper)
Pollutants: suspended sediment, turbidity, DDE, DDT, dieldrin
Approved: September 13, 2002

TMDL Implementation
Detailed Implementation Plan: The DIP was completed in December, 2003.

Point source implementation: WLAs for TSS were developed for the following two municipal dischargers: Cle Elum WWTP (WA-0021938), and Ellensburg WWTP (WA-0024341). The contributions of suspended sediment from these point sources represent less than 0.1% of the load; WLA are consistent with the current NPDES permit limits. The point sources are not considered to be a source of organochlorine pesticides, and were not given a pesticide WLA in the TMDL.

Non-point source implementation:
Non-point source implementation of this TMDL relies primarily on the reduction of sediment into the Upper Yakima Basin. Because organochlorine pesticides adhere to sediment and are transported along with sediment into a waterbody, the reduction of sediment loading will also reduce organochlorine pesticide loading.

- Irrigation district/company managers call Ecology if farmers exceed turbidity limits 3 times within the current irrigation season. The turbidity samples are taken from a return flow as it leaves a field or group of fields (but prior to mixing in receiving water); limits are 300 NTU turbidity as measured by a turbidimeter, or 350 NTU turbidity as measured by a turbidity tube. Ecology will do effectiveness monitoring in 2006.
- Erosion in irrigation furrows was reduced through use of PAM and straw residue, and was funded through cost share with the County and the CD (1997)
- NRCS EQIP provided $800,000 to Kittitas County for sprinkler systems. More are added each year; presently 10 – 20% of farms have converted to sprinkler irrigation.
- Sediment basins have been installed.
- Outreach to community members has provided information on the causes of sediment/turbidity and organochlorine pesticide pollution and why it's bad for the environment; how organochlorine pesticides attach to soil particles and why it's so important for soil to stay on farms; and what can be done to help reduce/eliminate sediment/turbidity pollution (e.g., irrigation methods, road maintenance practices).
- Forest and Fish rules result in additional protection of riparian areas, including leaving an appropriate buffer and mature trees, as well as improved road maintenance on currently used roads, and closure of unused roads.
- The US Forest Service's compliance with their Memorandum of Agreement with Ecology has also achieved further protection of riparian areas, improved road maintenance on currently used roads, and closure of unused roads.
- Compliance with Kittitas County's Critical Areas Ordinances has resulted in greater protection of existing riparian vegetation, especially trees.

A free, penalty-free agricultrual pesticide turn-in event was held in Kittitas County in 2004. Although the use of DDT was banned in 1973, and the use of dielderin was banned in 1974, these pesticides are still occasionally found in their manufactured form in agricultural areas.

Interim and Final TMDL targets:
The TMDL establishes interim targets for DDT, DDE, dieldrin, turbidity and suspended sediment to be met in October 2006, and final targets to be met in October 2011.

Is water quality improving? Are additional implementation measures needed?
It's too soon to evaluate whether or not BMPs are affecting water quality. Kittitas County Water Purveyors and the Kittitas County Conservation District are doing effectiveness monitoring for turbidity and suspended sediment. Data limitations prevent a conclusive assessment of area-wide trends at this time, although the water quality of some waterbodies does appear to be improving.

Yakima River (Lower)
Central Regional Office
Pollutants: suspended sediment and DDT
Approved: November 25, 1998

TMDL Implementation:
Detailed Implementation Plan**:** The SIS/DIP was completed on June 30, 1999

Point-source implementation**:** No point sources were found to be contributing to elevated levels of suspended sediment or DDT in this watershed.

Non-point source implementation:
Non-point source implementation of this TMDL relies primarily on the reduction of sediment into the Lower Yakima Basin. Because organochlorine pesticides adhere to sediment and are transported along with sediment into a waterbody, the reduction of sediment loading will also reduce organochlorine pesticide loading.

A landmark partnership was formed between two irrigation districts in the Yakima Valley: the Sunnyside Valley Irrigation District and the Roza Irrigation District. The Roza-Sunnyside Board of Joint Control ("Board") adopted a comprehensive Water Quality Policy designed to promote agricultural and irrigation practices that decrease pollution and water use while increasing water quality and conservation. The Policy, developed with support and input from local landowners, farmers, and growers, sets incremental, yearly, on-farm turbidity targets that farmers must meet. The Board established an extensive monitoring system that provides a consistent stream of data, and included enforcement mechanisms in the Policy to ensure compliance with total suspended sediment and other TMDL issues.

If on-farm targets are not met, the landowner is responsible for taking corrective action by submitting both a Short-term and a Long-term Water Quality Plan for how they will achieve the water quality goal. If the discharger continues to be in violation of the water quality policies, the Board can reduce water delivery services to the farm until the plan has been implemented and subsequent monitoring indicates compliance.

The Board helped the farmers meet yearly turbidity targets by providing education, technical assistance, and identifying outside resources. The Board worked closely with a significant number of growers who voluntarily converted from water-intensive and erosive rill and furrow irrigation methods to sprinkler or drip systems, as well as implementing other best management practices (e.g., sedimentation basins) to control erosion. The Board helped secure from Washington's Department of Ecology $10 million in low-interest loans to help irrigators upgrade irrigation systems.

Irrigation improvement projects, including construction of settling ponds and filter strips, were funded by grants from the USGS, Yakama Nation, and WSU Cooperative Extension Research Station at Prosser. Also, one lateral irrigation ditch has been converted from open ditch to pipe each year through assessments to farmers. Piping reduces evaporation and, in many cases, delivers pressurized water to farms which, in turn, makes it easier for growers to utilize drip and sprinkler systems. Irrigation improvement projects have also been funded by the USDA's Natural Resources Conservation Service (NRCS) PL-566 and Environmental Quality Incentives Program (EQIP), Conservation Districts, Conservation Commission, and the US Department of Interior's Bureau of Reclamation.

Interim and final TMDL targets:
The 5 year interim target includes meeting the turbidity target of 25 NTU at all drains and tributaries. The 10 year target includes achieving not more than a 5 NTU increase for the Yakima River between RM 116.3 and RM 8.4. The 15 year target is to comply with the 1 ng/L DDT chronic aquatic toxicity criterion via the 7 mg/L TSS target (or its modified form), and to a have control strategy to meet DDT human health criteria. The 20 year target is to meet the DDT human health criteria.

Is water quality improving? Are additional implementation measures needed?
Effectiveness monitoring indicates that the 5 year target for sediment has been met at most sites. Effectiveness monitoring is coordinated by Ecology CRO staff in coordination with South Yakima CD, Yakama Nation, Benton CD and Sunnyside Valley Irrigation District.